Contribution ID: 284

Type: Oral

Latest results of searches for invisible Higgs Boson decays in events with vector-boson fusion signatures in the ATLAS experiment

Sunday 6 July 2025 13:10 (20 minutes)

This report presents an overview of the latest results and research methodology of the search for Higgs boson decay into Dark Matter particles, during the process of Higgs boson production in the vector boson fusion [1]. The results were obtained in the ATLAS experiment at the Large Hadron Collider (LHC) using data collected during the Run II of LHC ($\sqrt{s} = 13$ TeV) and were interpreted in the context of models where the Higgs boson son acts as a portal to dark matter, where limits are set on the scattering cross section of weakly interacting massive particles and nucleons [2].

Assuming the Standard Model cross section for the Higgs boson, an upper limit of 0.145 was set on the branching fraction into DM particles at 95% confidence level, with an expected limit of 0.103. Obtained values at ATLAS experiment were compared with the results of direct searches experiments [3].

Further plans for the ATLAS experiment to study this process using partial Run 3 data are also presented.

- 1. ATLAS Collaboration, Journal of High Energy Physics 2022, 104 (2022)
- 2. G. Arcadi, A. Djouadi, and M. Raidal, Physics Reports 842, 1-180 (2020)
- 3. M. Zaazoua, L. Truong, K. A. Assamagan, and F. Fassi, Letters in High Energy Physics 2022, 270 (2022)

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Session Classification: 4. Relativistic nuclear physics, high-energy and elementary particle physics

Track Classification: Section 4. Relativistic nuclear physics, high-energy and elementary particle physics.